GCSE Science

Engaging new resources for both the AQA and OCR Gateway GCSE (9-1) Science specifications.

Every student will need support in making good progress and to succeed in the new linear Science GCSEs.

With regular reviews and assessment that address performance as well as skills and understanding, our resources provide exactly that, for students at every level.

And we’ve done it in the most easily accessible way.

Our Student Books are in the AQA approval process and will be submitted to the OCR endorsement process.

Series Editor: Ed Walsh
Authors: John Beeby Ann Daniels Sandra Mitchell Anne Pilling

www.collins.co.uk/GCSEScience
GCSE Science

GCSE Science is changing, and our new resources for AQA and OCR Gateway will develop and embed the skills your students need to succeed in all three assessment objectives, while providing a clear and supportive route through the new, more challenging GCSE content.

- **Teach with confidence** – our AQA Student Books, have been accepted for the AQA approval process and the OCR Gateway Student Books will be submitted to the OCR endorsement process.

- **Fully flexible support in print and digital formats** – our course structure allows you to teach your way. With 2, 3 and 5 year schemes of work allowing easy progression from KS3 and a strong basis for A level sciences, plus options for teaching foundation and higher, single sciences and combined.

- **Cover the requirements of the new (9-1) specifications** – teaching and learning resources combined with regular assessment that enables progression for every student.

- **Coverage of the new required practicals** – develop and test skills in analysing, interpreting and evaluating information and ideas so students are fully prepared for the indirect assessment.

- **Build maths skills** – a dedicated maths spread in every chapter and skills at the appropriate level embedded throughout, provide a wealth of support and practice.

For AQA Single Science

For AQA Combined Science: Trilogy and Combined Science: Synergy

For OCR Gateway Single Science

For OCR Gateway Combined Science

[www.collins.co.uk/GCSEScience](http://www.collins.co.uk/GCSEScience)
How is Collins GCSE (9-1) Science structured?

Teach
Teacher Packs
Comprehensive support for delivering the new science GCSEs with detailed introductions to the new specifications, 2, 3 and 5 year schemes of work, and an editable bank of differentiated lesson plans and worksheets.

Assess
Ensure all students make good progress with our new, innovative assessment framework that uses regular checkpoints to help you analyse and track students’ progress across the linear course. See page 5 for full details.

Learn
Student Books
Written by a team of expert authors for the new GCSE (9-1) specifications for AQA and OCR Gateway, the student books support students of all abilities with ramped content and questions on every page. Go to collins.co.uk/GCSEscience for full details of how the resources support progress for all of your students.

Build Skills
Worked examples and practice questions incorporated throughout the Student Books support the new maths and practical requirements. Go to collins.co.uk/GCSEscience for full details of support for maths and practicals.

Collins Connect
Content is available online at home and at school, meaning it’s ideal for use as a front-of-class teaching tool and as a way to set homework and tests. See page 9 for full details.
Key changes to the new Science GCSEs

### Practical assessment
- Controlled assessment is being discontinued and at least 15% of the total marks available for each GCSE will be dedicated to practical skills

### An increased maths element
- Maths will account for 10-30% of assessment marks for single science (minimum of 10% in Biology, 20% Chemistry, 30% Physics) and 20% for combined (1:2:3 Biology, Chemistry, Physics).
- Foundation tier students must demonstrate maths skills at a minimum of KS3 Level and Higher tier students at a minimum of Foundation level GCSE Maths

### A linear course
- There are no modules, all assessment will take place at the end of Year 11

### New assessment objectives
- Assessment objective split:
  - AO1 (knowledge recall) – 40%
  - AO2 (application) – 40%
  - AO3 (analysis of information and ideas) – 20%

### New exams and grading system
- 9–1 grading system for Single Science
- Combined Science will have a 17 point grading scale, from 9-9, 9-8 through to 2-1, 1-1

### More challenging content:
- The level of content has increased, as has the level of challenge

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### How our resources support you

- Build and test the skills students need for the new practical assessment
- Full support for practical work, including lesson plans, worksheets and technician notes, in the Teacher Packs
- Resources for each required practical are available on Collins Connect to help students consolidate and practise their learning

- A Maths Skills spread in every chapter provides support for applying maths to science
- Maths skills are embedded throughout and tested at the appropriate level
- Maths activities on Collins Connect help students practise the skills they need for assessment

- Monitor assessment using regular assessment and common review checkpoints
- A bank of summative assessment materials and tracking tools in Collins Connect help you track performance across the course and target areas for improvement

- Questions highlight which assessment objectives they are targeting
- Online digital testing on Collins Connect provides targeted feedback on student performance against each assessment objective

- Differentiated content throughout
- Colour coded indicator on each page shows the ramping of demand

- Written for the 2016 specifications
- Written by a team of expert authors, the Student Books have entered AQA’s approval process and will be submitted to OCR for endorsement
**Formative Assessment**

<table>
<thead>
<tr>
<th>When</th>
<th>Where</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing informal and self assessment</td>
<td>- Integrated questions on every page and at the end of every chapter</td>
<td>- Students can review how well they’ve understood a topic</td>
</tr>
<tr>
<td></td>
<td>- Digital, auto-marked homeworaks for every lesson</td>
<td>- Helps check whether students have mastered the lesson content</td>
</tr>
<tr>
<td></td>
<td>- Detailed lesson plans with embedded opportunities to review students’ performance</td>
<td>- Next steps can be planned effectively</td>
</tr>
</tbody>
</table>

**Ramped questions and outcomes embedded throughout**

**Summative Assessment**

<table>
<thead>
<tr>
<th>When</th>
<th>Where</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of topic</td>
<td>- Print and digital tests:</td>
<td>- Generate group and individual reports to analyse performance by:</td>
</tr>
<tr>
<td></td>
<td>- Print and digital tests track students’ progress on a topic-by-topic basis</td>
<td>- Assessment objective (AO1, AO2, AO3) to see where strengths and weaknesses are</td>
</tr>
<tr>
<td></td>
<td>- Print and digital tests provide common review checkpoints throughout the linear course</td>
<td>- By skill to track performance in maths, required practicals and synoptic questions</td>
</tr>
<tr>
<td></td>
<td>- Print tests help students prepare and practice for final assessment</td>
<td>- By individual question type to scrutinise where errors were made</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Get targeted feedback for every student for every test so they know which areas to focus on.</td>
</tr>
</tbody>
</table>

Regular assessment points to help you track and analyse student performance

Builds effectively on the Collins Science Key Stage 3 assessment framework to provide consistency in student data from age 11 to 16.
Student Books

- Accepted for the AQA approval process and will be submitted to OCR Gateway for endorsement.
- Written by a team of expert authors for the 2016 specifications.
- Combine clear and comprehensive explanations with a wealth of practice opportunities, to help build the skills that students will need to succeed.
- Dedicated pages for practical and maths skills ensure students are fully prepared for the new requirements.
- Co-teach both Foundation and Higher tier with a single book.
- Key concept spreads highlight concepts that students must grasp before they can move on.

Each spread starts with language and ideas at a lower level and increases in complexity, engaging students of all ability levels.

Prepare students for the demands of the new specification with differentiated questions, worked examples and lots of opportunities to practice.

www.collins.co.uk/GCSEscience
**Required practicals spreads in each chapter build and test students’ development of the appropriate skills**

**Maths skills are embedded throughout the book and revisited in dedicated maths pages**

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**Presenting and processing data**

The ear plates are incubated, and the clear zones measured. Scientists need to analyse the data they have collected.

<table>
<thead>
<tr>
<th>Concentration of sodium hypochlorite (gdm⁻¹)</th>
<th>Area of clear zone around disc (mm²)</th>
<th>Mean area of clear zone around disc (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.0</td>
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<td>34</td>
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</tr>
<tr>
<td>5.0</td>
<td>579</td>
<td>582</td>
</tr>
</tbody>
</table>

3. How is the area of a clear zone calculated? Hint: you need to recall a formula.

4. Complete the table by calculating the mean area of the clear zone around each disc.

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**Biology**

**MATHS SKILLS**

**Size and number**

**Learning objectives:**
- Make estimates of the results of simple calculations, without using a calculator.
- Be able to use ratio and proportion to calibrate a microscope.
- Recognise and use numbers in decimal and standard form.

**Estimating cell size**

Accurate measurements are often essential but estimating cell size or number is sometimes sufficient and may be quicker.

To estimate cell size, we can count the number of cells that fit across a microscope’s field of view.

**Size of one cell =** number of cells that cross this diameter

If the field of view of this microscope, at this magnification, is 0.5 mm on 1000 mm, we can do a quick calculation without:

1. In this image, estimate the cells fit across the field of view. We rounded numbers down to make calculations easier.

**DO YOU KNOW?**

Scientists estimate cell organism numbers if it is impossible or unnecessary to count them all.

**MEMBER:**

The power to tell you how many places the decimal point should be moved to, for large numbers, and places to the left for small numbers.

**Real-life contexts and applications are included to show students the relevance of the concepts they are studying**

**Higher-only content is clearly flagged for easy co-teaching**
Deliver the new GCSE Science curriculum with confidence, using the detailed support for introducing and teaching the new specification

Make planning easy with 2, 3 and 5 year schemes of work and a comprehensive set of editable lesson plans and worksheets

Equip students with the skills they need for working scientifically, using maths, and carrying out practicals

Prepare students for the demands of the new specification with differentiated questions and activities in every lesson and targeted supporting worksheets

Co-teach both Foundation and Higher tier with a single book (the Higher-only content is clearly flagged)

All resources are also provided on CD-ROM

Go to www.collins.co.uk/GCSEscience to download a free 5 year scheme of work.
Teach GCSE Science flexibly and in a way that suits your students with a full suite of digital resources

Powered by an innovative online learning platform, Collins Connect makes GCSE Science content available at home and at school, meaning it’s ideal for use as a front-of-class teaching tool and as a way to set homework and tests.

- Teach flexibly
  - Interactive digital version of the Student Book, ideal for whiteboard use
  - Book view provides total fluidity between digital and print with a page for page match

- Build skills
  - Maths activities help students develop the skills they need for GCSE
  - Resources for all required practicals help students consolidate and practice their learning
  - Build confidence in answering longer questions with downloadable, editable practice questions with full mark scheme

You can trial Collins Connect completely free for 14 days. Email education.support@harpercollins.co.uk to find out more. Sample material is also available for you to look at online for free – visit connect.collins.co.uk/secondary-teaching-resources.
Five year Scheme of Work

A free, flexible scheme of work that supports you in your planning by providing different timetabling examples depending on the number of teachers you are using to teach GCSE and whether you are teaching it over a two or three year period.

The Collins GCSE Science (9-1) Five Year Scheme of Work:

- Identifies ten key scientific concepts
- Outlines the development of students’ understanding in these concepts over the five years from age 11 to 16
- Maps to Collins Science, chapter by chapter, showing the detailed progression at the heart of the course

Transition Units

Help your Year 9 students get to grips with key ideas and prepare them to work at a GCSE level of challenge with our ready-to-go units, specifically written to address the transition from KS3 to the new GCSE science.

- Flexible units that can be used in any order, so you can pick up and teach in a way that suits your timetable
- Cover 5 key ideas from the new curriculum: Seedlings and coloured light, sound reflectors, barometric pressure, rhododendrons and milk glue
- Each unit includes three lesson plans, resource sheets, worksheets, technician notes and front of class PowerPoints

Download for free from www.collins.co.uk/GCSEscience
About the Authors

John Beeby
After completing a PhD in insect biochemistry, John Beeby was a teacher of Biology and Chemistry. He has extensive examining experience. John has a passion for making science interesting and relevant and the latest scientific research and developments accessible to learners.

Ann Daniels
Ann is a former headteacher, curriculum developer, teacher trainer and teacher in the UK. She now works as an Educational Consultant, international adviser and assessment specialist.

Sandra Mitchell
Sandra Mitchell spent over twenty years working in schools, as a Head of Physics and a Head of Science. She has extensive examining experience and is a writer, having contributed to several successful textbooks.

Anne Pilling
Anne began her career undertaking research into slow release nutrient tablets and copper based fungicides before becoming a secondary school Science teacher based in the North West. She went on to work as a Consultant Adviser for a local authority, initially as part of the National Strategies initiative, with responsibility for primary and secondary science before taking up her current role as an independent consultant. Anne also has extensive examining experience.

Ed Walsh
Ed Walsh is a curriculum developer, CPD provider and school improvement officer. A teacher for twenty years and a team leader for twelve of those, he now writes and edits curriculum materials, designs and delivers CPD and works with science departments to improve the quality of their provision. He regularly presents sessions at ASE regional and national conferences and is a Regional Development Leader for the Science Learning Network in the south west. Ed’s current projects include developing the Science Mark programme for the National Science Learning Centre, piloting the use of iPads in science teaching and writing STEM teaching materials for Siemens. He lives in Cornwall, where he works with local schools as Science Adviser.
Collins GCSE Science: Component chart

<table>
<thead>
<tr>
<th>AQA</th>
<th>OCR Gateway</th>
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<tr>
<td><strong>Student Books</strong></td>
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<tr>
<td>Biology 978-0-00-815875-0 £18.99 • Jan 2016</td>
<td>Biology for Combined Science: Trilogy 978-0-00-817504-7 £12.99 • March 2016</td>
</tr>
<tr>
<td>Chemistry 978-0-00-815876-7 £18.99 • Feb 2016</td>
<td>Chemistry for Combined Science: Trilogy 978-0-00-817505-4 £12.99 • March 2016</td>
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<tr>
<td>Life and environmental Sciences for Combined Science: Synergy 978-0-00-817495-8 £18.99 • May 2016</td>
<td>Physical sciences for Combined Science: Synergy 978-0-00-817496-5 £18.99 • May 2016</td>
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<tr>
<td><strong>Teacher Packs</strong></td>
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<tr>
<td>Biology 978-0-00-815878-8 £125 • March 2016</td>
<td>Biology 978-0-00-815012-7 £125 • April 2016</td>
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<td>Combined Science: Trilogy 978-0-00-815879-8 £150 • Apr 2016</td>
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AQA GCSE Science powered by Collins Connect
Covers all Separate and Combined AQA GCSE (9-1) Science specifications
1 year subscription 978-0-00-817497-2 £750 (+VAT) • April 2016
3 year subscription 978-0-00-817498-9 £1,500 (+VAT) • April 2016

OCR Gateway GCSE Science powered by Collins Connect
Covers all Separate and Combined OCR Gateway GCSE (9-1) Science specifications
1 year subscription 978-0-00-817502-3 £750 (+VAT) • April 2016
3 year subscription 978-0-00-817503-0 £1,500 (+VAT) • April 2016

Year 9 Transition Unit 1: Seedlings and coloured light
Unit 2: Sound reflectors
Unit 3: Barometric pressure
Unit 4: Rhododendrons
Unit 5: Milk glue

Terms and conditions:
The prices quoted here are for individual components. Our sales consultants are always happy to discuss your requirements and find a package that suits your needs, including exclusively digital solutions.

For the full terms and conditions please visit www.connect.collins.co.uk.
Pub dates are subject to Ofqual feedback on exam board specifications.

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